UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,703	01/16/2002	Sang-Bom Kang	9898-207	1366

20575 7590 10/10/2008

MARGER JOHNSON & MCCOLLOM, P.C.
210 SW MORRISON STREET, SUITE 400
PORTLAND, OR 97204

EXAMINER	
ZERVIGON, RUDY	
ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
10/10/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/052,703	KANG ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-8,11-19,21-27,32-37 and 41-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-8,11-19,21-27,32-37 and 41-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 2-8, 44, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie; Kuniaki et al. (US 6132512 A) in view of Moslehi; Mehrdad M. (US 5192849 A). Horie teaches:

i. Horie teaches a shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) for supplying a reaction gas to a wafer (W; Figure 7) in a process chamber (1; Figure 7; column 7, lines 1-40), the shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) comprising circular plates (31,32; Figure 12b; column 11, lines 4-40), each of the circular plates (31,32; Figure 12b; column 11, lines 4-40) arranged substantially parallel to each other in a vertically stacked arrangement, each of the circular plates (31,32; Figure 12b; column 11, lines 4-40) having substantially the same diameter, each of the circular plates (31,32; Figure 12b; column 11, lines 4-40) including gas paths ("C"; Figure 12b; 24; Figure 10) for supplying a reaction gas to the process chamber (1; Figure 7; column 7, lines 1-40), wherein a gap ("D"; Figure 12b) exists between central regions of adjacent ones of the circular plates (31,32; Figure 12b; column 11, lines 4-40), wherein a gas path ("C"; Figure 12b) included in one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) and a gas path ("C"; Figure 12b) included in another of the plates (31,32; Figure 12b; column 11, lines 4-40) are in fluid communication with each other via the gap ("D"; Figure 12b), and wherein a lowermost one (32) of the circular plates

(31,32; Figure 12b; column 11, lines 4-40) includes cooling lines (B'; Figure 12b), coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), each of the cooling lines (B'; Figure 12b) connecting one of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) to one of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), the shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) further comprising: a first outer cooling line (D; Figure 12C) arranged outside the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) connecting the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45); and a second outer cooling line (other D after 26; Figure 12C) arranged outside the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) connecting the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) - claim 8. Applicant's claim requirement of "cooling" is a claim requirement of intended use in thepending appartus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

ii. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 8, the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) including a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) that consists of a first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) arranged along the first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged along the second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), the cooling lines (B,B'; Figure 10; column 10, lines 21-45) arranged such that they are parallel to one another, as claimed by claim 4

iii. the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along the circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) such that the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are arranged in pairs consisting of one coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) and one coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45), an angular spacing between the one coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the one coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45) of each pair less than the angular spacing between the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines

21-45) and an angular spacing between the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) - claim 5

Horie does not teach:

i. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 8, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40), the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) arranged such that each coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) is separated from an adjacent coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) by an angular spacing that is substantially equal to 360 degrees divided by a total number of coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged such that lines drawn from each of the outlets to a radial center of the lower (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) divide the lower (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) into substantially equal parts, as claimed by claim 2

ii. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 2, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) consisting of four coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) consisting of four coolant outlets (25c1,c2,c3; Figure

10; column 10, lines 21-45), the cooling lines (B,B'; Figure 10; column 10, lines 21-45) consisting of four cooling lines (B,B'; Figure 10; column 10, lines 21-45), as claimed by claim 3

iii. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 3, the four cooling lines (B,B'; Figure 10; column 10, lines 21-45) arranged such that a path of each of the four cooling lines (B,B'; Figure 10; column 10, lines 21-45) *within* the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) forms two legs of a right triangle, as claimed by claim 6

iv. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 8, the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) including a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) that consists of a first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), wherein a total number of coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a total number of coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are both even numbers, half of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and half of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged along the first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45), the other half of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the other half of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged along the

second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), the cooling lines (B,B'; Figure 10; column 10, lines 21-45) arranged such that they are parallel to one another, as claimed by claim 7

v. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 8, wherein an upper surface of the lowermost one (32; Figure 12b; column 11, lines 4-40) of the circular plates (31,32; Figure 12b; column 11, lines 4-40) is exposed to the gap ("D"; Figure 12b) and wherein the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are *arranged within* the lowermost one (32; Figure 12b; column 11, lines 4-40) of the circular plates (31,32; Figure 12b; column 11, lines 4-40) between the upper surface and a lower surface of the lowermost one (32; Figure 12b; column 11, lines 4-40) of the circular plates (31,32; Figure 12b; column 11, lines 4-40), as claimed by claim 44

vi. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 8, wherein the lowermost one (32; Figure 12b; column 11, lines 4-40) of the circular plates (31,32; Figure 12b; column 11, lines 4-40) includes fewer gas paths than another circular plate (31; Figure 12b; column 11, lines 4-40) above the lowermost one of the circular plates (31,32; Figure 12b; column 11, lines 4-40), as claimed by claim 45

Moslehi teaches a cooled wafer chuck (Figure 2,3) including:

i. upper surface of the lowermost one (70; Figure 2) of the circular plates (70,68; Figure 2) is exposed to the gap (betwen 68,70 Figure 2) and wherein the coolant inlets (Inlet 1,2; Figure 3) and the coolant outlets (Outlets 1,2; Figure 3) are arranged within the lowermost one (70; Figure 2) of the circular plates (70,68; Figure 2) between the upper

surface and a lower surface of the lowermost one (70; Figure 2) of the circular plates (70,68; Figure 2), as claimed by claim 44

It would have been obvious to one of ordinary skill in the art at the time the invention was made to reproduce Horie's coolant inlet and coolant outlet parts at optimized relative positions as taught by Moslehi.

Motivation to reproduce Horie's coolant inlet and coolant outlet parts at optimized relative positions as taught by Moslehi is to optimize the heat transfer as taught by Horie (column 2; lines 38-54) and Moslehi (column 2, line 67 – column 3, line 10). Further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). Additonally, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art.(Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04).

3. Claims 11-19, 21-27, 32-37, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie; Kuniaki et al. (US 6132512 A) in view of Tomoyasu; Masayuki et al. (US 6544380 B2). Horie is discussed above. Horie further teaches:

i. the heater stage (3,4; Figure 7; column 7, lines 1-40) configured to have an adjustable height (17, 18; Figure 7) within the process chamber (1; Figure 7; column 7, lines 1-40), a bottom of the heater stage (3,4; Figure 7; column 7, lines 1-40) configured to contact an upper surface of the separating device (not numbered; Figure 7 - elements immediately above 17) at a lower position of the heater stage (3,4; Figure 7; column 7, lines 1-40),

wherein a position of the separating device (not numbered; Figure 7 - elements immediately above 17) remains fixed relative to the process chamber (1; Figure 7; column 7, lines 1-40) – claim 11

ii. wherein the separating device (not numbered; Figure 7 - elements immediately above 17) is configured to separate the heater stage (3,4; Figure 7; column 7, lines 1-40) and the process chamber (1; Figure 7; column 7, lines 1-40) by a uniform distance – claim 12

iii. The apparatus (Figure 7; column 7, lines 1-40) of claim 19, further comprising: a shaft (not numbered; Figure 7) installed beneath the heater stage (3,4; Figure 7; column 7, lines 1-40) and configured to raise and lower the heater stage (3,4; Figure 7; column 7, lines 1-40); and a shaft introduction portion (17, 18; Figure 7) configured to introduce the shaft (not numbered; Figure 7) at the bottom of the process chamber (1; Figure 7; column 7, lines 1-40), as claimed by claim 17

iv. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, the plurality of plates (31,32; Figure 12b; column 11, lines 4-40) substantially circular in shape and having substantially the same diameter, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower plate (32; Figure 12b; column 11, lines 4-40), the circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) consisting of a first semicircular edge (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a second semicircular edge (25c1,c2,c3; Figure 10; column 10, lines 21-45) that together form a circle, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) disposed along the first

semicircular edge (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along the second semicircular edge (25c1,c2,c3; Figure 10; column 10, lines 21-45), and the inner cooling lines (B,B'; Figure 10; column 10, lines 21-45) disposed parallel to each other, as claimed by claim 23

v. The apparatus (Figure 7; column 7, lines 1-40) of claim 21, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along the circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower plate (32; Figure 12b; column 11, lines 4-40) such that the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are arranged in pairs consisting of one coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) and one coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45), an angular spacing between the one coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the one coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45) of each pair less than an angular spacing between the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and an angular spacing between the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), as claimed by claim 24

vi. The apparatus (Figure 7; column 7, lines 1-40) of claim 22, the four cooling lines (B,B'; Figure 10; column 10, lines 21-45) arranged such that a path of each of the four cooling lines (B,B'; Figure 10; column 10, lines 21-45) within the lower plate (32; Figure 12b;

column 11, lines 4-40) consists of two straight lines that intersect at a right angle, as claimed by claim 25

vii. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, further comprising: a shaft (not numbered; Figure 7) configured to raise and lower the heater stage (3,4; Figure 7; column 7, lines 1-40), said shaft (not numbered; Figure 7) arranged beneath the heater stage (3,4; Figure 7; column 7, lines 1-40); and a shaft introduction portion (17, 18; Figure 7) configured to contain the shaft (not numbered; Figure 7) at the bottom of the process chamber (1; Figure 7; column 7, lines 1-40), as claimed by claim 35

viii. the process chamber (1; Figure 7; column 7, lines 1-40) having a bottom wall (17, Figure 7; column 7, lines 1-40) that defines a lower boundary of the process chamber (1; Figure 7; column 7, lines 1-40), the separating device (not numbered; Figure 7 - elements immediately above 17) disposed such that a bottom surface of the separating device (not numbered; Figure 7 - elements immediately above 17) is in physical contact with the bottom wall (17, Figure 7; column 7, lines 1-40) of the process chamber (1; Figure 7; column 7, lines 1-40) – claim 41

Horie does not teach:

i. An apparatus (Figure 7; column 7, lines 1-40) for forming a thin film, said apparatus (Figure 7; column 7, lines 1-40) comprising: a process chamber (1; Figure 7; column 7, lines 1-40) having a bottom wall (17, Figure 7; column 7, lines 1-40) that defines a lower-most boundary of the process chamber (1; Figure 7; column 7, lines 1-40); a heater stage (3,4; Figure 7; column 7, lines 1-40) disposed within the process chamber (1; Figure 7; column 7, lines 1-40) and entirely above the bottom wall (17, Figure 7; column 7, lines 1-

40), the heater stage (3,4; Figure 7; column 7, lines 1-40) configured to support a wafer (W; Figure 7) and to heat the wafer (W; Figure 7) to a high temperature; a shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) disposed above the heater stage (3,4; Figure 7; column 7, lines 1-40), the shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) configured to supply a reaction gas to the wafer (W; Figure 7); a separating device (not numbered; Figure 7 - elements immediately above 17) disposed beneath the heater stage (3,4; Figure 7; column 7, lines 1-40), a lower surface of the separating device (not numbered; Figure 7 - elements immediately above 17) disposed in contact with the bottom wall (17, Figure 7; column 7, lines 1-40), the separating device (not numbered; Figure 7 - elements immediately above 17) configured to separate the heater stage (3,4; Figure 7; column 7, lines 1-40) from the bottom wall (17, Figure 7; column 7, lines 1-40) and to reduce a volume of processing space within the process chamber (1; Figure 7; column 7, lines 1-40): and a process chamber (1; Figure 7; column 7, lines 1-40) cooling system configured to cool a bottom surface of the process chamber (1; Figure 7; column 7, lines 1-40) whereon the separating device (not numbered; Figure 7 - elements immediately above 17) is located, as claimed by claim 19

ii. The apparatus (Figure 7; column 7, lines 1-40) of claim 12, wherein the heater stage (3,4; Figure 7; column 7, lines 1-40) and the process chamber (1; Figure 7; column 7, lines 1-40) are separated by about 2 to about 10 cm, as claimed by claim 13

iii. The apparatus (Figure 7; column 7, lines 1-40) of claim 19, wherein the separating device (not numbered; Figure 7 - elements immediately above 17) comprises a heat-resistant material, as claimed by claim 14

iv. The apparatus (Figure 7; column 7, lines 1-40) of claim 14, wherein the heat-resistant material is a ceramic material, as claimed by claim 15

v. The apparatus (Figure 7; column 7, lines 1-40) of claim 11, wherein the separating device (not numbered; Figure 7 - elements immediately above 17) is ring shaped, the upper surface of the separating device (not numbered; Figure 7 - elements immediately above 17) configured to abut a lower surface of the heater stage (3,4; Figure 7; column 7, lines 1-40), a substantial portion of the upper surface of the separating device (not numbered; Figure 7 - elements immediately above 17) disposed directly beneath the lower surface of the heater stage (3,4; Figure 7; column 7, lines 1-40), as claimed by claim 16

vi. The apparatus (Figure 7; column 7, lines 1-40) of claim 17, wherein the shaft introduction portion (17, 18; Figure 7) is formed as a flexible bellows and has a length that varies as the shaft (not numbered; Figure 7) is raised and lowered, as claimed by claim 18

vii. An apparatus (Figure 7; column 7, lines 1-40) for forming a thin film, said apparatus (Figure 7; column 7, lines 1-40) comprising: a process chamber (1; Figure 7; column 7, lines 1-40): a heater stage (3,4; Figure 7; column 7, lines 1-40) arranged in a lower (32; Figure 12b; column 11, lines 4-40) portion of the process chamber (1; Figure 7; column 7, lines 1-40) and configured to support a wafer (W; Figure 7) and to heat the wafer (W; Figure 7) to a high temperature; a shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) disposed in an upper portion of the process chamber (1; Figure 7; column 7, lines 1-40) and configured to supplying a reaction gas to the wafer (W; Figure 7), said shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) comprising a plurality of plates (31,32; Figure 12b; column 11, lines 4-40) having a plurality of gas

paths ("C"; Figure 12b; 24; Figure 10) formed therein and a shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) cooling system arranged in a lowermost one of the plurality of plates (32; Figure 12b; column 11, lines 4-40); said cooling system comprising a plurality of coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), a plurality of coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), and a plurality of independent inner cooling lines (B,B'; Figure 10; column 10, lines 21-45) for connecting each of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) to one of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45); a separating device (not numbered; Figure 7 - elements immediately above 17) arranged between the process chamber (1; Figure 7; column 7, lines 1-40) and the heater stage (3,4; Figure 7; column 7, lines 1-40), the separating device (not numbered; Figure 7 - elements immediately above 17) arranged to separate the heater stage (3,4; Figure 7; column 7, lines 1-40) and a bottom of the process chamber (1; Figure 7; column 7, lines 1-40) by a substantially uniform amount, the substantially uniform amount in the range of about 2 to about 10 cm a first outer cooling line (D; Figure 12C) located outside the lowermost one of the plurality of plates (32; Figure 12b; column 11, lines 4-40) and configured to connect the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45); and a second outer cooling line (other D after 26; Figure 12C) located outside the lowermost one of the plurality of plates (32; Figure 12b; column 11, lines 4-40) and configured to connect the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), as claimed by claim 27

viii. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, the plurality of plates (31,32; Figure 12b; column 11, lines 4-40) substantially circular in shape and having

substantially the same diameter, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower plate (32; Figure 12b; column 11, lines 4-40), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged such that each coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45) is separated from a nearest adjacent coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45) by an angular spacing that is substantially equal to 360 degrees divided by a total number of coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) arranged such that lines drawn from each of the inlets to a radial center of the lower-most plate divide the lower plate (32; Figure 12b; column 11, lines 4-40) into substantially equal parts, as claimed by claim 21

ix. The apparatus (Figure 7; column 7, lines 1-40) of claim 21, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) consisting of four coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) consisting of four coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), and the inner cooling lines (B,B'; Figure 10; column 10, lines 21-45) consisting of four inner cooling lines (B,B'; Figure 10; column 10, lines 21-45), as claimed by claim 22

x. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, the lower plate (32; Figure 12b; column 11, lines 4-40) having a substantially circular shape, the lower plate (32; Figure 12b; column 11, lines 4-40) including a circumferential edge (25b,c1,b,c2,b,c3;

Figure 10; column 10, lines 21-45) that consists of a first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), wherein a total number of coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a total number of coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are both even numbers, half of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and half of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are alternately arranged along the first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45), the other half of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the other half of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are alternately arranged along the second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), and the cooling lines (B,B'; Figure 10; column 10, lines 21-45) are arranged such that they are parallel to one another, as claimed by claim 26

xi. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, wherein the separating device (not numbered; Figure 7 - elements immediately above 17) is formed of a heat-resistant material, as claimed by claim 32

xii. The apparatus (Figure 7; column 7, lines 1-40) of claim 32, wherein the heat-resistant material is a ceramic material, as claimed by claim 33

xiii. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, wherein the separating device (not numbered; Figure 7 - elements immediately above 17) is ring shaped and is configured to abut a bottom surface of the heater stage (3,4; Figure 7; column 7, lines 1-40), as claimed by claim 34

xiv. The apparatus (Figure 7; column 7, lines 1-40) of claim 35, wherein the shaft introduction portion (17, 18; Figure 7) comprises a flexible bellows wall having a variable length depending on the raising and lower (32; Figure 12b; column 11, lines 4-40)ing of the shaft (not numbered; Figure 7), as claimed by claim 36

xv. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, further comprising a process chamber (1; Figure 7; column 7, lines 1-40) cooling system arranged in thermal communication with a lower (32; Figure 12b; column 11, lines 4-40) portion of the process chamber (1; Figure 7; column 7, lines 1-40), said lower (32; Figure 12b; column 11, lines 4-40) portion of the process chamber (1; Figure 7; column 7, lines 1-40) supporting the separating device (not numbered; Figure 7 - elements immediately above 17), as claimed by claim 37

Tomoyasu teaches a wafer processing apparatus (Figure 18) including:

i. a separating device (527; Figure 18) disposed beneath the heater stage (526; Figure 18), a lower surface of the separating device (527; Figure 18) disposed in contact with the bottom wall (546; Figure 18), the separating device (527; Figure 18) configured to separate the heater stage (526; Figure 18) from the bottom wall (546; Figure 18) and to reduce a volume of processing space within the process chamber (502; Figure 18): and a process chamber (502; Figure 18) cooling system (521; Figure 18) configured to cool a bottom surface of the process chamber (502; Figure 18) whereon the separating device (527; Figure 18) is located - claim 19

ii. The apparatus (Figure 7; column 7, lines 1-40) of claim 19, wherein the separating device (527; Figure 18) comprises a heat-resistant material ("heat insulating wall"; column 14; lines 13-21) - claim 14

iii. the separating device (527; Figure 18) is ring shaped, the upper surface of the separating device (527; Figure 18) configured to abut a lower surface of the heater stage (526; Figure 18), a substantial portion of the upper surface of the separating device (527; Figure 18) disposed directly beneath the lower surface of the heater stage (526; Figure 18) - claim 16

iv. a shaft introduction portion (544, 547; Figure 18) is formed as a flexible bellows (547; Figure 18) and has a length that varies as the shaft (544; Figure 18) is raised and lowered - claim 18

v. the separating device (527; Figure 18) is ring shaped and is configured to abut a bottom surface of the heater stage (526; Figure 18) - claim 34

vi. the shaft introduction portion (544, 547; Figure 18) comprises a flexible bellows (547; Figure 18) wall having a variable length depending on the raising and lower (32; Figure 12b; column 11, lines 4-40)ing of the shaft (544; Figure 18) - claim 36

vii. a process chamber (502; Figure 18) cooling system (521; Figure 18) arranged in thermal communication with a lower portion of the process chamber (502; Figure 18), said lower portion of the process chamber (502; Figure 18) supporting the separating device (527; Figure 18), as claimed by claim 37

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Horie's lifting mechanism (17,18; Figure 7) with Tomoyasu's lifting mechanism (544,

547; Figure 18) and adding Tomoyasu's cooling system (521; Figure 18). Further it would have been obvious to one of ordinary skill in the art at the time the invention was made to reproduce Horie's coolant inlet and coolant outlet parts at optimized relative positions, inclusive, to use ceramic material parts.

Motivation to replace Horie's lifting mechanism (17,18; Figure 7) with Tomoyasu's lifting mechanism (544, 547; Figure 18) and adding Tomoyasu's cooling system (521; Figure 18) is for influencing wafer temperature control as taught by Tomoyasu (column 10; lines 50-62). Further it would have been obvious to one of ordinary skill in the art at the time the invention was made to reproduce Horie's coolant inlet and coolant outlet parts at optimized relative positions, inclusive, to use ceramic material parts as taught by Tomoyasu (column 10; lines 50-62 – "aluminum nitride"). Further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). Additonally, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art.(Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04).

4. Claims 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie; Kuniaki et al. (US 6132512 A) and Tomoyasu; Masayuki et al. (US 6544380 B2) in view of Chen; Lee et al. (US 4534816 A). Horie and Tomoyasu are discussed above. Horie further teaches Horie's separating device (not numbered; Figure 7 - elements immediately above 17) is disposed inside the process chamber. Horie and Tomoyasu do not teach:

i. The apparatus of claim 19, wherein the process chamber (502; Figure 18) cooling system (521; Figure 18) is disposed outside the process chamber, as claimed by claim 42

ii. the process chamber cooling system (521; Figure 18) is disposed outside the process chamber (502; Figure 18), as claimed by claim 43

Chen teaches a similar wafer processing apparatus (Figure 1) including a cooling system (40) located outside of the process chamber (10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have added an additional cooling plate to the apparatus of Tomoyasu.

Motivaiton to have added an additional cooling plate to the apparatus of Tomoyasu is for increasing temperature control.

Response to Arguments

5. Applicant's arguments filed July 8, 2008, January 28, 2008 and April 16, 2007 have been fully considered but they are not persuasive.

6. Applicant states:

“

Rejecting claim 8, the Office Action asserts that the heating liquid medium passage D shown in FIG. 12B of Horie reads on the claimed gap and that portions of material gas passages C extending through the disks 31 and 32, also shown in FIG. 12B of Horie, read on the claimed gas paths. Thus, *the Office Action asserts that the portions of material gas passages C extending through the disks 31 and 32 are in fluid communication with each other via the heating liquid medium passage D*. Applicants respectfully disagree

“

And..

“

In view of the actual teachings of Hofie reproduced above, it is clear that the material gas passages C are completely sealed from the heating liquid medium passages B, B' and D. Because the material gas passages C are completely sealed from the heating liquid medium passage D, portions of material gas passages C extending through the disks 31 and 32 cannot be in fluid communication with each other via the heating liquid medium passage D as asserted by the Office Action

“

In response, the Examiner has asserted that Horie indeed teaches that a gas path (“C”; Figure 12b) included in one of the circular plates (any of 31,32; Figure 12b; column 11, lines 4-40) and a gas path (“C”; Figure 12b) included in another of the plates (any of 31,32; Figure 12b; column 11, lines 4-40) are in fluid communication with each other via the gap (“D”; Figure 12b). As a result, the heating liquid medium passage D is thus shown to be the conduit that is isolated from

the gas path but meets the claim requirement of providing "fluid communication" between one of the circular plates (any of 31,32; Figure 12b; column 11, lines 4-40) and another of the plates (any of 31,32; Figure 12b; column 11, lines 4-40). Nothing in the pending claims requires that any type of fluid mixing as Applicant's above statements imply.

7. Applicant's arguments (January 28, 2008) with respect to claims 2-8 have been considered but are moot in view of the new grounds of rejection.

8. Applicant states:

“

Applicants respectfully submit, however, that the "separating device 527" of Tomoyasu (i.e., a heat insulating wall) is not disposed beneath the "heater stage 526", is not disposed in contact with the "bottom wall 546" (i.e., a support plate) and is not configured to separate the heater 526 from the support plate 546. As is clearly shown in FIG. 18, the heat insulating wall 527 is disposed laterally adjacent to the heater 526 and a wafer-mounted stage 525. As is also clearly shown in FIG. 18, the heat insulating wall 527 is disposed in contact with a bottom plate 521. Because the heat insulating wall 527 of Tomoyasu is disposed laterally adjacent to the beater 526 and a wafer-mounted stage 525, and is also disposed in contact with a bottom plate 521, Applicants respectfully submit that Tomoyasu cannot teach wherein the heat insulating wall 527 is disposed beneath the heater 526, in contact with the support plate 546, and be configured to separate the heater 526 from the support plate 546. For at least these reasons, Applicants respectfully submit that the combination of Horie in view of Tomoyasu falls to teach or suggest each and every element recited in claim 19 and, therefore, fails to render claim 19 obvious. See M.P.E.P. § 2143.03

“

In response, Applicant is mistaken, Tomoyasu shows a lower portion (520) of the separating device (527; Figure 18) disposed beneath the heater stage (526; Figure 18).

Applicant states:

“

Rather, the aforementioned arguments of Applicants' previous response asserted that "the Office Action identifies no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Horie using the heat insulating wall 527 of Tomoyasu in a manner that arrives at the structure recited in claim 197' The insulating wall 527 of Tomoyasu is not a part of either the "lifting mechanism 544,547" nor the "cooling system 521" of Tomoyasu. Thus, arguments alleging the obviousness of replacing "Horie's lifting mechanism (17,18...) with Tomoyasu's lifting mechanism (544,547...) and adding Tomoyasu's cooling system (521...)" do not answer the substance of arguments pointing out that the Office Action falls to identify any suggestion or motivation to modify Horie using the heat insulating wall 527 of Tomoyasu in a manner that arrives at the structure recited in claim 19 (i.e., in a manner that arrives at the structure recited in claim 19..

“

9. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant states on 1/28/2008:

“

In the "Response to Arguments" section, the current Office Action appears to assert that the arguments presented at page 13, lines 9-21 of Applicants' previous response (traversing the rejection of claim 11) are unpersuasive because "drawings can be used as prior art," "[d]rawings

and pictures can anticipate claims if they clearly show the structure which is claimed," and '~he picture must show all the claimed structural features and how they are put together."

Nevertheless, the aforementioned arguments traversing the rejection of claim 11 asserted that "FIG. 7 of Horie does not illustrate wherein the [the unnumbered item shown in FIG. 7 of Horie, immediately above table 17] is disposed directly vertically beneath the substrate holder 3." Thus, the drawings of Horie do not show the structure as recited in claim 11. If the current rejection of claim 11 is to be maintained, Applicants respectfully request the substance of this argument be answered. Otherwise, Applicants request withdrawal of the current rejection of claim 11. See M.P.E.P. § 707.07(f).

Applicants further note that the arguments presented at page 13, line 22-page 14, line 3 of Applicants' previous response (traversing the rejection of claim 12) were not answered, let alone addressed. If the current rejection of claim 12 is to be maintained, Applicants respectfully request the substance of this argument be answered. Otherwise, Applicants request withdrawal of the current rejection of claim 12. See M.P.E.P. § 707.07(0

“

Turning to 4/16/2007, page 13:

“

Applicants respectfully submit however, that the unnumbered item shown in FIG. 7 of Horie, immediately above table 17 is not described in the specification of Horie. Moreover, FIG. 7 of Horie does not illustrate wherein the aforementioned unnumbered item is disposed directly vertically beneath the substrate holder 3. Accordingly, Horie cannot teach or even suggest wherein "the heater stage (3,4...) [is] configured to contact an upper surface of the separating

device (not numbered...) at a lower position of the heater stage" as asserted in the Office Action. Tomoyasu does not contain any teaching that cure this deficiency of Horie. For at least these additional reasons, Applicants respectfully submit that the combination of Horie in view of Yomoyasu fails to teach or suggest each and every element recited in claim 11 and, therefore, fails to render claim 11 obvious. See M.P.E.P. § 2143.03

Further rejecting claim 12, the Office Action asserts that Horie teaches wherein "the separating device (not numbered; Figure 7 - elements immediately above 17) is configured to separate the heater stage (3,4...) and the process chamber (1...) by a uniform distance.

"

In response, it is known that drawings can be used as prior art such that drawings and pictures can anticipate claims if they clearly show the structure which is claimed. In re Marz , 173 USPQ 25 (CCPA 1972). However, the picture must show all the claimed structural features and how they are put together. Jockmus v. Leviton , 28 F.2d 812 (2d Cir. 1928). The origin of the drawing is immaterial. For instance, drawings in a design patent can anticipate or make obvious the claimed invention as can drawings in utility patents. When the reference is a utility patent, it does not matter that the feature shown is unintended or unexplained in the specification. The drawings must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art. In re Aslanian, 200 USPQ 500 (CCPA 1979). See MPEP § 2121.04 for more information on prior art drawings as "enabled disclosures."

Conclusion

10. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1792 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

/Rudy Zervigon/

Primary Examiner, Art Unit 1792